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TRANSMITTAL FORM

(to be used for all correspondence after initial filing)

Application Number	09/762,779
Filing Date	July 3, 2001
First Named Inventor	Johannes Gijsbertus Antonius Terlingen
Art Unit	1641
Examiner Name	Gary W. Counts
Total Number of Pages in This Submission: 27	Attorney Docket Number: 702-010166

ENCLOSURES (Check all that apply)

- ☒ Fee Transmittal Form
  - ☒ Fee Attached
- ☐ Preliminary Amendment
  - ☐ After Final
  - ☐ Affidavits/declaration(s)
- ☐ Extension of Time Request
- ☐ Express Abandonment Request
- ☐ Information Disclosure Statement
- ☐ Certified Copy of Priority Documents
- ☐ Response to Missing Parts/ Incomplete Application
  - ☐ Response to Missing Parts under 37 CFR 1.52 or 1.53
- ☐ Drawings
- ☐ Licensing-related Papers
- ☐ Petition for Extension of Time
- ☐ Petition to Convert to a Provisional Application
- ☐ Power of Attorney, Revocation Change of Correspondence Address
- ☐ Terminal Disclaimer
- ☐ Request for Refund
- ☐ CD, Number of CD(s)_____
- ☐ After Allowance communication to Technology Center (TC)
- ☐ Appeal Communication to Board of Appeals and Interferences
- ☒ Appeal Communication to TC **(Appeal Notice, Brief, Reply Brief)**
- ☐ Proprietary Information
- ☐ Status Letter
- ☒ Other Enclosure(s) (please identify below)

Postcard for return receipt

Remarks

SIGNATURE OF APPLICANT, ATTORNEY, OR AGENT

Firm or Individual name	Barbara E. Johnson Registration No. 31,198
Signature	
Date	September 2, 2005

CERTIFICATE OF TRANSMISSION/MAILING

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Typed or printed name	Helen Gerace		
Signature		Date	September 2, 2005

PTO/SB/17 (12-04)
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Effective on 12/08/2004.
Fees pursuant to the Consolidated Appropriations Act, 2005 (H.R. 4818).

FEE TRANSMITTAL For FY 2005

☐ Applicant claims small entity status. See 37 CFR 1.27

TOTAL AMOUNT OF PAYMENT	($)500.00

Complete if Known	
Application Number	09/762,779
Filing Date	July 3, 2001
First Named Inventor	Johannes Gijsbertus Antonius Terlingen
Examiner Name	Gary W. Counts
Art Unit	1641
Attorney Docket No.	0702-010166

METHOD OF PAYMENT (check all that apply)

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FEE CALCULATION

1. BASIC FILING, SEARCH, AND EXAMINATION FEES

	FILING FEES		SEARCH FEES		EXAMINATION FEES		
		Small Entity		Small Entity		Small Entity	
Application Type	Fee ($)	Fee ($)	Fee ($)	Fee ($)	Fee ($)	Fee ($)	Fees Paid ($)
Utility	300	150	500	250	200	100	
Design	200	100	100	50	130	65	
Plant	200	100	300	150	160	80	
Reissue	300	150	500	250	600	300	
Provisional	200	100	0	0	0	0	

2. EXCESS CLAIM FEES

Fee Description	Fee ($)	Small Entity Fee ($)
Each claim over 20 or, for Reissues, each claim over 20 and more than in the original patent	50	25
Each independent claim over 3 or, for Reissues, each independent claim more than in the original patent	200	100
Multiple dependent claims	360	180

Total Claims		Extra Claims	Fee ($)	Fee Paid ($)
21	20 or HP = 24	0	x 0 =	0

HP = highest number of total claims paid for, if greater than 20

Multiple Dependent Claims Fee ($)	Fee Paid ($)

Indep. Claims		Extra Claims	Fee ($)	Fee Paid ($)
2	3 or HP = 4	0	x 0 =	0

HP = highest number of independent claims paid for, if greater than 3

3. APPLICATION SIZE FEE

If the specification and drawings exceed 100 sheets of paper, the application size fee due is $250 ($125 for small entity) for each additional 50 sheets or fraction thereof. See 35 U.S.C. 41(a)(1)(G) and 37 CFR 1.16(s).

Total Sheets		Extra Sheets		Number of each additional 50 or fraction thereof	Fee ($)	Fee Paid ($)
_____	- 100 =	_____	/ 50 =	_____ (round **up** to a whole number)	x _____	= _____

4. OTHER FEE(S)

	Fee Paid ($)
Non-English Specification,	
Other: Appeal Brief filing fee	$500.00

SUBMITTED BY

Signature	Barbara E. Johnson	Registration No. (Attorney/Agent) 31,198	Telephone 412-471-8815
Name (Print/Type)	Barbara E. Johnson		Date September 2, 2005

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Application No.	:	09/762,779
Appellants	:	Johannes Gijsbertus Antonius Terlingen et al.
Filed	:	July 3, 2001
Title	:	DEVICE FOR INVESTIGATING CHEMICAL INTERACTIONS AND PROCESS UTILIZING SUCH DEVICE
Group Art Unit	:	1641
Examiner	:	Gary W. Counts
Confirmation No.	:	7918
Customer No.	:	28289

MAIL STOP APPEAL BRIEF - PATENTS
Commissioner for Patents
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APPEAL BRIEF

Sir:

This Appeal Brief is submitted in support of the Notice of Appeal filed on June 29, 2005 and received at the Patent Office on July 5, 2005. The Notice of Appeal appeals the final rejection of claims 25 and 29-48.

The headings used hereinafter and the subject matter set forth under each heading are in accordance with 37 C.F.R. § 41.37.

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail in an envelope addressed to Mail Stop Appeal Brief - Patents, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on September 2, 2005.

Helen Gerace
(Name of Person Mailing Paper)

Helen Gerace September 2, 2005
Signature Date

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I. REAL PARTY IN INTEREST

Holland Biomaterials Group B.V. is the Assignee of the entire right, title, and interest to the above-identified application and, as such, is the real party in interest in this Appeal.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals or interferences known to the Appellants, the Appellants' legal representative, or the Assignee of the above-identified application which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending Appeal.

III. STATUS OF CLAIMS

Claims 1-24 and 26-28 have been canceled.

Claims 25 and 29-48 are pending and are appealed.

Claims 44 and 45 stand finally rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness.

Claims 25 and 29-31 stand finally rejected under 35 U.S.C. § 102(b) for anticipation by International Application No. WO 90/05303 to Bergstrom et al. (hereinafter "the Bergstrom patent").

Claims 25, 29-31, 33, 37-45 and 48 stand finally rejected under 35 U.S.C. § 103(a) for obviousness over European Patent No. 0104608 to Dunn et al. (hereinafter "the Dunn patent") in view of the Bergstrom patent.

Claims 32, 34, 46 and 47 stand finally rejected under 35 U.S.C. § 103(a) for obviousness over the Dunn patent and the Bergstrom patent in view of U.S. Patent No. 5,942,397 to Tarlov et al. (hereinafter "the Tarlov patent").

Claim 35 stands finally rejected under 35 U.S.C. § 103(a) for obviousness over the Dunn patent and the Bergstrom patent in view of U.S. Patent No. 5,723,219 to Kolluri et al. (hereinafter "the Kolluri patent").

Claim 36 stands finally rejected under 35 U.S.C. § 103(a) for obviousness over the Dunn patent and the Bergstrom patent in view of U.S. Patent No. 5,932,296 to Sluka et al. (hereinafter "the Sluka patent").

Claims 25 and 29-48 are reproduced in Appendix A which is attached hereto.

IV. STATUS OF AMENDMENTS

No response after the Final Office Action of March 29, 2005 has been submitted in this case. The claims on appeal are the claims as amended by the Amendment of December 22, 2004, which have been finally rejected in the Final Office Action of March 29, 2005.

V. SUMMARY OF CLAIMED SUBJECT MATTER

The claims on appeal in the present application are directed to a device for investigating reactions between interactive chemical or biological species. The device includes a substrate and a plasma layer. The substrate includes a film of free electrons metal that consists essentially of gold. The plasma layer includes sulfur plasma which is deposited directly on the gold film of the substrate and defines a stable deposited plasma layer. To study real time surface interactions using surface plasmon resonance spectroscopy (SPR), a

sensitive surface is required. SPR uses reflectance of light, generated by a laser, to analyze the growth or disintegration of a layer, for instance, of biological molecules at the surface (page 1, lines 15-23 of the present application).

When analyzing surface interactions using SPR, analysis of the interactions of biological species in the surface composition layer before and after rinsing will vary if a loss of mass occurs in the surface layer after the rinsing step. Therefore, a stable layer is important in order to obtain good controllability of the sensing surface. For example, the immobilization of albumin on a COOH-functionalized sensing device of the present invention as described in Example 12, resulted in an angle decreased of only 30 milli-degrees upon further rinsing, thus showing that albumin immobilization was very stable (Fig. 1 and page 16, lines 1-4 of the present specification).

As discussed in the present application at pages 7 and 11, the properties that exhibit a stable deposit plasma layer are quantified in the comparative test data shown in Tables 1 and 4, respectively, which show the percentage of gold in a surface composition before and after rinsing. When a less stable (i.e., sulfur-free) plasma layer is deposited onto a gold surface, more gold from the underlying gold surface appears at the surface deposited layer after rinsing. Table 1 shows the percentage of gold in the surface composition before and after rinsing where the plasma deposit layer did not include sulfur. The results show 6.8% gold in the surface composition before rinsing and 13.4% gold after rinsing (i.e., a 98% increase). In contrast, Table 4 shows a percentage of gold in the surface composition before and after rinsing when a plasma deposited layer includes sulfur. The results show 0.7% gold in the surface composition before rinsing and 0.9% gold after rinsing (i.e., a 28% increase). Therefore, the loss of mass in the surface composition of a plasma layer that does not include sulfur is thirty three (33) times greater than the loss of mass on the surface composition of the

sulfur-containing plasma layer. Because the loss of mass of the sulfur plasma layer after rinsing is minimal, the device exhibits good controllability (page 3, lines 5-6 of the present application). Furthermore, because the functional layer is plasma deposited, control over the depositing thereof can be accurately carried out, whereby a very thin layer can be deposited thus providing very sensitive devices, without the need for firstly arranging an organic layer by wet chemical methods on the substrate before any further investigation can be carried out (page 2, line 36 to page 3, line 4 of the present application).

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

The following issues are presented in this Appeal:

a) Are claims 44 and 45 indefinite?

b) Are claims 25 and 29-31 anticipated by the Bergstrom patent?

c) Are claims 25, 29-31, 33, 37-45 and 48 directed toward obvious subject matter in light of the Dunn patent in view of the Bergstrom patent?

d) Are claims 32, 34, 46 and 47 directed toward obvious subject matter in light of the Dunn and the Bergstrom patent in view of the Tarlov patent?

e) Is claim 35 directed towards obvious subject matter in light of the Dunn patent and the Bergstrom patent in view of the Kolluri patent?

f) Is claim 36 directed toward obvious subject matter in light of the Dunn patent and the Bergstrom patent in view of the Sluka patent?

VII. ARGUMENT

Each issue presented for review is addressed hereinafter under the appropriate heading:

1. 35 U.S.C. § 112, first paragraph

None.

2. 35 U.S.C. § 112, second paragraph

a. Rejections for Indefiniteness

Claims 44 and 45 stand finally rejected under 35 U.S.C. § 112, second paragraph, for indefiniteness for the reasons discussed on pages 2 and 3 of the Final Office Action. The Examiner asserts that claims 44 and 45 do not set forth the steps involved in performing the method. Furthermore, the Examiner asserts that it is not clear whether the Appellants are referring to the sulfur that has been deposited on the substrate or to a sample containing a chemical or biological species which binds to the sulfur. For the reasons identified below, the rejection may be seen as without basis.

Claim 44 is directed to a method for investigating the interaction of pre-determined chemical or biological species, comprising the step of analyzing the interaction between chemicals or biological species arranged on a device according to claim 25. Claim 46 is directed to a method for investigating the reaction between chemically interacted species, comprising the step of exposing or depositing chemical or biological species on the device of claim 25.

The definiteness of claim language must be analyzed, not in a vacuum, but in light of (1) the content of the particular application disclosure, (2) the teachings of the prior art, and (3) the claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made. See, e.g., *In re Marosi*, 710 F.2d 799 (1983); *Rosemount, Inc. v. Beckman Instruments, Inc.,* 727 F.2d 1540 (1984); *W.L. Gore & Assocs., Inc. v. Garlock, Inc.*, 721 F.2d 1540 (1983); and *Atmel Corp. v. Information Storage Devices, Inc.,* 198 F.3d 1374 (1999).

Regarding claim 44, the techniques used for performing the "analyzing" of the interaction between chemical or biological species arranged on a device according to claim 25 are disclosed on page 1, lines 9-21 of the present application and can be seen as well known in the art. The technology for performing the "analyzing" thus does not need to be included in claim 44. Regarding claim 45 which depends from claim 44, the ordinary and plain meaning of the terms "exposing" or "depositing" are clear and, therefore, the step of exposing or depositing chemical or biological species on the device of claim 25 is definite. This is particularly true in view of the language of claims 44 and 45 and Examples 11 and 12 on pages 14-16 of the specification, in which it is clear that the claims refer to the chemical or biological species arranged on the sulfur plasma layer of the device of claim 25.

In view of the foregoing, Appellants believe that claims 44 and 45 are definite and are in condition for allowance.

3. 35 U.S.C. § 102(b)

a. Rejections over the Bergstrom patent

Claims 25 and 29-31 stand rejected under 35 U.S.C. § 102(b) for anticipation by the Bergstrom patent for the reasons discussed on pages 3 and 4 of the Final Office Action. For the reasons discussed below, Appellants respectfully traverse the Examiner's rejection of the claims.

Independent claim 25 is directed to a device for investigating reactions between interactive chemical or biological species. The device comprises a substrate comprising a film of free electron metal consisting essentially of gold and a plasma layer comprising sulfur plasma deposited directly on the gold film of the substrate and defining a stable deposited plasma layer.

The Bergstrom patent is directed to methods for providing metal surfaces with surface layers capable of selective bio-molecular interactions. Furthermore, the invention also comprises activated surfaces for coupling a desired ligand, surfaces containing bound ligands, and the use of such surfaces in bio-sensors (page 1, first paragraph). The Bergstrom patent discloses a sensing surface for bio-sensor systems that includes a metal surface constituted by a film of free electron metals, such as copper, silver, aluminum or gold, wherein a monolayer of an organic molecule X-R-Y is supplied to the metal surface such that X binds to the metal and Y serves for coupling with functional ligands (page 5, third paragraph and page 6, second paragraph). The Bergstrom patent stresses the importance of a densely packed monolayer on the surface for protecting the metal surface from chemical corrosion. For the sake of optimum dense packing as stated in the Bergstrom patent, a hydrocarbon chain may optionally be interrupted by hetero atoms which are preferably straight having optionally double and/or triple bonds and a chain length that exceeds 10 atoms, preferably 12 to 30 atoms (page 6, fourth paragraph). Furthermore, the method of the Bergstrom patent of forming a densely packed layer to protect the underlying surface is referred to in the industry as self-assembled monolayers (SAMs), wherein a single layer is formed on a surface after a chemical reaction. In order to form this monolayer, the molecules must have a regular hydrocarbon chain that allows for this self-assembly into a well ordered, densely packed layer. The length of the hydrocarbon chain also affects the stability of the formed layer. As discussed below in detail, the Bergstrom patent does not teach or suggest a device that comprises a substrate having a plasma layer.

The term "plasma" has often been referred to as the fourth state of matter. The generation of plasma is analogous to the transition that occurs when energy is supplied to solid material, causing it to melt with the liquid's becoming a gas. When sufficient additional

energy is supplied to a gas, plasma is created. A plasma describes a state of a partially ionized gas which can, for example, be induced by applying an electric field to the gas under reduced pressure. The free electrons in the discharge are accelerated by the electric field and collide with neutral gas molecules. Due to these collisions, metastables, positive ions, electrons, free radicals and UV radiation are generated. When a plasma is created from a hydrocarbon gas, the plasma polymers are no longer polymer analogues of the "monomer." Under plasma conditions, the monomer molecules undergo fragmentation and deposit polymer molecules onto a solid surface. However, the plasma polymer does not contain regularly repeating units (e.g., the chains are branched and are randomly terminated with a high degree of crosslinking). Because the plasma phase consists of a wide variety of very reactive species, the final composition of a surface after treatment with a plasma is essentially disordered and unpredictable and does not have the same chemical composition as the gas that was originally used. Therefore, the stable sulfur plasma layer of the present invention is a completely different layer having substantially different properties from the self-assembled monolayer disclosed in the Bergstrom patent. Because the Bergstrom patent does not teach each and every element in claim 25, particularly the stable sulfur plasma layer, the Appellants have met their burden under 35 U.S.C. § 102. MPEP 2131.

In view of the foregoing, Appellants believe that independent claim 25 is novel over the Bergstrom patent and is in condition for allowance.

Because claims 29-31 depend either directly or indirectly from independent claim 25, these claims are also believed to be novel over the Bergstrom patent for at least the same reasons as discussed above in connection with claim 25.

4. 35 U.S.C. § 103(a)

a. Rejections over the Dunn patent and the Bergstrom patent

Claims 25, 29-31, 33, 37-45 and 48 stand rejected under 35 U.S.C. § 103(a) for asserted obviousness over the Dunn patent in view of the Bergstrom patent. The Examiner asserts that the Dunn patent teaches the claimed invention except for the teaching of (1) a film of gold on the substrate and (2) a biochemical functional layer that is chemically arranged on the plasma deposited first functional group species layer. Therefore, the Examiner contends that it would have been obvious to one of ordinary skill in the art to incorporate the use of a gold film as taught by the Bergstrom patent into the method and apparatus of the Dunn patent in order to provide for a more stable metal surface because of corrosion stability considerations. Furthermore, the Examiner asserts that it would have been obvious to one of ordinary skill in the art to incorporate a hydrogel as taught by the Bergstrom patent into the method and device of the Dunn patent in order to provide for the minimization of undesired interactions. For the reasons discussed below, Appellants believe that these assertions are in condition for reversal.

Independent claim 25 has been discussed above. Independent claim 33 is directed to a process for producing a device for investigating reactions between interactive chemical and biological species. The process comprises the steps of (a) providing a pre-selected substrate, the substrate comprising a film of free electron metal consisting essentially of gold and (b) arranging a layer comprising sulfur plasma directed on the gold film by plasma deposition and defining a stable deposited plasma layer.

The Dunn patent is directed to a method for chemically modifying the surface of organic and/or inorganic substrates for attachment of large molecules having available functional groups, such as proteins. Further, the surface of the substrate is irreversibly modified by grafting specific chemical functional groups onto the surface with a plasma of suitable material, such as sulfur (see page 5, lines 13-20). The Dunn patent also discloses

generally that the surface to be modified can be made of inorganic materials, such as non-metals, metals and metal oxides, and that the metals can include iron, aluminum, tin, copper and nickel (page 8, lines 30-31). Examples 1-3 of the Dunn patent disclose the use of plasma deposited onto polystyrene. As discussed below in detail, therefore, there is no teaching, suggestion or motivation in the Dunn patent to deposit a plasma layer directly onto a gold substrate to achieve new and unexpected stability of the gold substrate per se.

To establish a *prima facie* case of obviousness, the Examiner must satisfy the following three requirements. First, the prior art relied upon, coupled with the knowledge generally available in the art at the time of the invention, must contain some suggestion or incentive that would have motivated the skilled artisan to modify references or combine references. See *Karsten Mfg. Corp. v. Cleveland Golf Co.*, 242 F.3d 1376, 1385 (Fed. Cir. 2001). The motivation to modify the prior art must flow from some teaching in the art that suggests the desirability or incentive to make the modification needed to arrive at the claimed invention. The motivation must come from the prior art, and not from the applicant's specification. Second, the proposed modification of the prior art must have had a reasonable expectation of success, determined from the vantage point of the skilled artisan at the time the invention was made. In other words, a hindsight analysis is not allowed. See *Amgen, Inc. v. Chugai Pharm. Co.*, 927 F.2d 1200, 1209 (Fed. Cir. 1991). Lastly, the prior art reference or combination of references must teach or suggest all the limitations of the claims. See *In re Wilson*, 424 F.2d 1382, 1385 (C.C.P.A. 1970). In *EWP Corp. v. Reliance Universal, Inc.*, 755 F.2d at 907, it states that "a reference must be considered for everything it teaches by the way of technology and is not limited to the particular invention it is describing and attempting to protect. On the issue of obviousness, the combined teachings of the prior art as a whole must be considered." By the same token, "[i]t is impermissible within the

framework of § 103 to pick and choose from any one reference only so much of it as will support a given position, to the exclusion of other parts necessary to the full appreciation of what such reference fairly suggests to one of ordinary skill in the art." *In re Wesslau*, 353 F.2d 238, 241. As discussed in detail below, a fair reading of the Dunn patent in its entirety would not lead or motivate the skilled artisan to use gold, specifically, as a substrate for sulfur plasma deposit or that the gold and sulfur plasma would give new and unexpected results.

Examples 1-3 of the Dunn patent refer to a polystyrene substrate which is drastically different from a gold substrate. Polystyrene is an inexpensive and hard plastic that is produced by free radical vinyl polymerization from the monomer styrene. Polystyrene is typically used to make rigid durable products, such as television and computer cabinets, appliances, toys, etc. Further, the list of metals disclosed in the Dunn patent includes iron, aluminum, tin, copper and nickel, but not gold. Each of the five listed metals is unique and exhibits different surface characteristics, such as adhesion, during plasma deposition. For example, copper (i.e, Group Ib transition metal) has specific bonding characteristics that are different from iron (i.e., Group VIII metal) and, therefore, would exhibit different adhesion properties during plasma deposition. The person skilled in the vapor plasma deposition art knows that changing the substrate from one metal to another (without changing any other parameters) can substantially affect the deposition rate and the adhesion properties of the deposited material during plasma deposition. Furthermore, gold is a rare, noble metal that is known for its resistance to oxidation and corrosion. A noble metal is defined as any metal that has resistance to corrosion or oxidation and includes gold, silver and platinum. Silver and platinum also exhibit corrosion-resistant properties similar to gold. However, the list of metals disclosed in the Dunn patent does not include any of gold or silver or platinum. In

Bausch & Lomb, Inc. v. Barnes-Hind/Hydrocurve, Inc., 796 F.2d 443, 448-449, the District Court held "...by failing to consider a prior art reference in its entirety, ignored portions of the reference that read away from obviousness." When considering the Dunn patent in its entirety, wherein all of the Examples use a polystyrene substrate and the list of metal substrates fails to disclose any of the noble metals, the Dunn patent directs away from the use of gold as a substrate for plasma deposition.

As previously discussed, the Bergstrom patent requires a particular orientation of the organic molecule X-R-Y to the metal surface. For example, a specific orientation of the compound on the surface of the Bergstrom patent is such that X binds to the metal and Y serves for coupling with functional ligands. Because of the nature of a plasma, the specific type of orientation required in the process of the Bergstrom patent could not be achieved using a plasma, thereby destroying the intended function of the attachment process in the Bergstrom patent. Therefore, absent hindsight, there is no teaching, suggestion or motivation in the Dunn patent or the Bergstrom patent, alone or in combination, to provide a device that includes a gold substrate with a sulfur plasma layer on its surface.

Furthermore, the proper standard for combining references under § 103 requires determining what the prior art would have led a skilled person to do. As discussed above, the skilled artisan would not have been led to try gold as a substrate for plasma deposition after a fair reading of the Bergstrom patent and the Dunn patent. In the already of record, attached Affidavit, (Appendix B) by Dr. Gerardus Engbers (one of the named inventors of the present application), Dr. Engbers states that the specific orientation of the self-assembled monolayers (SAMs) could not be achieved by gas plasma deposition. Because a plasma as disclosed in the Dunn patent is not suitable to yield a surface with a high degree of order and functionality such as required by the Bergstrom patent, the Affidavit

substantiates that a skilled artisan would not have combined these two references together in the first place.

In view of the foregoing, independent claims 25 and 33 are believed to be patentable over the Dunn patent and the Bergstrom patent and are in condition for allowance.

Even if the Examiner were to consider it obvious to combine the Dunn patent and the Bergstrom patent, Appellants respectfully traverse the obviousness rejection of claims 25, 29-31, 33, 37-45 and 48 on the grounds that the claimed invention possesses unexpectedly improved surface properties that the prior art does not have.

Comparative test data shown in Table 1, page 7 and Table 4, page 11 of the present specification show the percentage of gold in a surface composition before and after rinsing. When a less stable (i.e., sulfur-free) plasma layer is deposited onto a gold surface, more gold from the underlying gold surface appears at the surface deposited layer after rinsing than when a stable sulfur plasma layer is deposited. Table 1 shows the percentage of gold in the surface composition before and after rinsing where the plasma deposited layer did not include sulfur. The results show 6.8% gold in the surface composition before rinsing and 13.4% gold after rinsing (i.e., a 98% increase). In contrast, Table 4 shows the percentage of gold in the surface composition before and after rinsing where the plasma deposited layer includes sulfur. The results show 0.7% gold in the surface composition before rinsing and 0.9% gold after rinsing (i.e., a 28% increase). The results indicate that the substrate having the plasma deposited layer that includes sulfur lost only 0.2% of its original mass compared to a 6.6% loss in mass when the plasma layer did not include sulfur. In other words, the loss of mass in the surface composition of a plasma layer that does not include sulfur is thirty three (33) times greater than the loss of mass on the surface composition of the sulfur-containing plasma layer. This significant improvement in stability or attachment of the

plasma layer to the underlying substrate improves the controllability and stability of the device when investigating reactions on the sensing surface using Surface Plasmon Resonance spectroscopy (SPR). Therefore, there is no motivation, suggestion, or reasonable expectation of success to combine the Dunn patent and the Bergstrom patent and arrive at the new and unexpected result of a stable sulfur plasma deposited layer of the claimed invention.

In view of the foregoing, Appellants believe that claims 25 and 33 are patentable over the Dunn patent and the Bergstrom patent and are in condition for allowance.

Because claims 29-31, 37-45 and 48 depend either directly or indirectly from independent claim 25 or 33, these claims are also believed to be patentable over the Dunn patent and the Bergstrom patent for the reasons discussed above in connection with claims 25 and 33.

b. Rejections over the Dunn patent and the Bergstrom patent in view of the Tarlov patent

Claims 32, 34, 46 and 47 stand finally rejected under 35 U.S.C. § 103(a) for obviousness over the Dunn patent and the Bergstrom patent in view of the Tarlov patent. The Examiner relies on the Tarlov patent for the asserted teaching of a substrate consisting of gold which has bound to its surface sulfur compounds. Because claims 32, 46 and 47 depend either directly or indirectly from claim 25, and claim 34 depends directly from claim 33, these claims are believed to be allowable over the teachings of the Dunn patent and the Bergstrom patent for the reasons discussed above.

c. Rejections over the Dunn patent and the Bergstrom patent in view of the Kolluri patent

Claim 35 stands rejected under 35 U.S.C. § 103(a) for obviousness over the Dunn patent and the Bergstrom patent in view of the Kolluri patent. The Examiner relies on the Kolluri patent for the asserted teaching of the use of a gas monomer and plasma

polymerization techniques. Claim 35 depends indirectly from claim 33 and is thus allowable over the teachings of the Dunn patent and the Bergstrom patent for the reasons discussed above.

d. Rejections over the Dunn patent and the Bergstrom patent in view of the Sluka patent

Claim 36 stands rejected under 35 U.S.C. § 103(a) for obviousness over the Dunn patent and the Bergstrom patent in view of the Sluka patent. The Examiner relies on the Sluka patent for the asserted teaching of the step of cleaning the substrate by means of a pulse argon plasma before the application of the functional groups to the substrate. Claim 36 depends directly from claim 33 and is thus allowable over the teaching of the Dunn patent and the Bergstrom patent for the reasons discussed above.

VIII. CONCLUSION

The claims define a functional surface sulfur plasma layer on a gold substrate having improved stability for investigation interactions of chemical or biological species using Surface Plasmon Resonance spectroscopy (SPR) techniques. In regard to the rejected claims, none of the cited prior art teaches or suggests a sulfur plasma (not a sulfur-containing compound) layer on a gold film of a substrate. Furthermore, the present invention possesses new and unexpectedly improved surface layer properties that the prior art does not have. Therefore, reversal of all the Examiner's rejections and allowance of claims 25 and 29-48 are respectfully requested.

A check in the amount of $500.00 is enclosed to cover the fee for filing the Appeal Brief.

The Commissioner for Patents and Trademarks is hereby authorized to charge any additional fees which may be required to Deposit Account No. 23-0650. Please refund any overpayments to Deposit Account No. 23-0650. An original and two copies of this Appeal Brief are enclosed.

Respectfully submitted,

THE WEBB LAW FIRM

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APPENDIX A

Claims 1-24 (Canceled)

25. (Previously Presented) A device for investigating reactions between interactive chemical or biological species, said device comprising:

a substrate comprising a film of free electron metal consisting essentially of gold; and

a plasma layer comprising sulfur plasma deposited directly on said gold film of said substrate and defining a stable deposited plasma layer.

Claims 26-28 (Canceled)

29. (Previously Presented) The device according to claim 25, wherein the plasma deposited layer, comprises one or more chemical or biological functional groups.

30. (Previously Presented) The device according to claim 29, further comprising one or more wet chemically deposited layer(s), arranged on the plasma deposited layer.

31. (Previously Presented) The device according to claim 25, wherein the plasma layers comprise one or more compounds selected from the group consisting of sulfur-containing compounds, thiols, sulfides, disulfides and diallyl sulfide.

32. (Previously Presented) The device according to claim 31, wherein the substrate consists essentially of gold.

33. (Previously Presented) A process for producing a device for investigating reactions between interactive chemical and biological species, said process comprising the steps of (a) providing a pre-selected substrate, said substrate comprising a film of free electron metal consisting essentially of gold and (b) arranging a layer comprising sulfur plasma directly on the gold film by plasma deposition and defining a stable deposited plasma layer.

34. (Previously Presented) The process according to claim 33, wherein the substrate consists essentially of gold, and wherein the plasma layer is directly deposited onto the substrate.

35. (Previously Presented) The process according to claim 33, wherein plasma is deposited from a monomer/oligomer/polymer in gas form, said monomer being saturated, partially saturated or unsaturated.

36. (Previously Presented) The process according to claim 33, wherein the substrate is subjected to a pre-cleaning step comprising pre-treating the substrate by means of a plasma etching step before the plasma deposition step.

37. (Previously Presented) The process according to claim 33, wherein the gas plasma is deposited under the following conditions:

a discharge power of up to 5000 W;

an exposure duration of up to 1000 s;

a plasma gas flow of up to 10000 cm^3/min;

a pressure of up to 1 bar; and

a frequency covering DC, AC, RF, and the MW ranges.

38. (Previously Presented) The process according to claim 37, wherein the gas plasma is deposited under the following conditions:

a discharge power of up to 500 W;

an exposure duration of up to 100 s;

a plasma gas flow of up to 100 cm^3/min;

a pressure between 0.001-50 mbar; and

a frequency between 2-60 Mhz,

wherein the discharge power is pulsed to the plasma, the pulse discharges being separated by up to 100 s.

39. (Previously Presented) The process according to claim 37, wherein the substrate is treated in an acid flow.

40. (Previously Presented) The process according to claim 38, wherein following pulse discharge, the substrate is after-treated with a pre-selected gas.

41. (Previously Presented) The process for providing a device according to claim 33, suitable for investigating reactions between interactive bio/chemical species by means of surface plasmon resonance spectroscopy, said process comprising the steps of:

preselecting a free electron metal substrate, which metal substrate is suitable for allowing investigation by surface plasmon resonance spectroscopy, arranging a pre-selected first functional group species on the free electron metal substrate by means of plasma deposition, which first functional group species protects the free electron metal substrate from a second functional group species whose interaction with the plasma deposited first functional group species can be investigated, thereby preventing undesirable interactions between the free electron metal substrate and the second functional group species, and which first functional group species provides functionality for the second functional group species; and

subsequently arranging a second functional group species on the plasma deposited layer of the first functional group species, whereafter interaction between the first and second

functional group species layers, can be investigated by means of surface plasmon resonance spectroscopy.

42. (Previously Presented) The process for providing a device according to claim 33, suitable for investigating reactions between interactive bio/chemical species by means of surface plasmon resonance spectroscopy, said process comprising the steps of:

preselecting a free electron metal substrate, which metal substrate is suitable for investigating and sensing surface interactions by surface plasmon resonance spectroscopy, arranging a pre-selected first functional group species on the free electron metal substrate by means of plasma deposition, which first functional group species protects the free electron metal substrate from a second functional group species whose interaction with the plasma deposited first functional group species can be investigated, thereby preventing undesirable interactions between the free electron metal substrate and the second functional group species, and which first functional group species provides functionality for the second functional group species.

43. (Previously Presented) The process according to claim 41, wherein before being exposed to the second functional group species, a bio/chemical functional layer is wet chemically arranged on the plasma deposited first functional group species layer, said wet chemically arranged functional layer being pre-selected for its specificity for the second functional group species and for the prevention of non specific interactions with the said second functional group species.

44. (Previously Presented) A method for investigating the interaction, of pre-determined chemical or biological species, comprising the step of analyzing the interaction between chemical or biological species arranged on a device according to claim 25.

45. (Previously Presented) A method for investigating the reaction between chemically interactive species, comprising the step of exposing or depositing chemical or biological species on the device of claim 25.

46. (Previously Presented) A method for investigating reactions between interactive bio/chemical species, by means of surface plasmon resonance spectroscopy, by the device of claim 25, wherein the method comprises the steps of pre-selecting a free electron metal substrate consisting essentially of gold, and a pre-selected, sulfur plasma deposited layer, and arranging on the free electron metal substrate the pre-selected sulfur plasma deposited layer, which plasma deposited functional group species having both attachment ability to the free electron metal substrate, and specificity to further functional group species, whereby the interaction therebetween is investigatable by means of surface plasmon resonance spectroscopy.

47. (Previously Presented) The method of claim 46, wherein the sulfur plasma deposited layer comprises one or more sulfur compounds.

48. (Previously Presented) The process according to claim 40, wherein the layer arranged by plasma deposition comprises at least one functional group species, and wherein the gas comprises the at least one functional group species.

APPENDIX B

AFFIDAVIT

In regard of US Patent Application 09/762,779 in the name of Holland Biomaterials Group, I, Gerardus Henricus Maria ENGBERS, Vlaanderenlaan 3, NL-7577 MB Oldenzaal, The Netherlands being one of the inventors named in the above referred to US Patent Application, do hereby declare the following.

I have studied the Office Action from the USPTO having a mailing date of the 10th of July 2003 as well as the documents referred to therein, being namely the European Patent Application 104608 of Dunn et al and the US Patent 6291188 in the name of Meade et al.

From this Office Action, it is apparent that the Examiner is of the opinion that Dunn describes a method and device for modifying the surface of a substrate with a suitable material by means of plasma deposition.

Dunn makes no reference to a substrate comprising a gold film. Nor does Dunn refer to the plasma layer being deposited directly onto the substrate.

According to the Examiner, Meade describes a method for treating a gold substrate by means of directly depositing a compound thereon, which compound comprises sulphur. The sulphur makes direct contact with the gold surface.

Meade makes no reference to plasma deposition of the sulphur comprising compound onto the gold surface.

However, on the basis of a combination of these described techniques, the Examiner concludes that it is obvious to provide a substrate, having a gold film, with a layer, which comprises sulphur compounds, by means of plasma deposition.

With respect, this is not the conclusion the skilled person would arrive at on the basis of these two documents.

Having reference to Meade, this describes the use of a gold substrate, and depositing thereon by means of wet chemistry a compound which has a sulphur group on one side thereof.

Having reference to Dunn, this describes deposition of a material which can comprise sulphur, oxygen, carbon, hydrogen, nitrogen, a halogen, for phosphor, onto a layer which may be metal, non-metal, a metal oxide, a mineral, salt, or glass.

The examples of Dunn relate to sulphur or nitrogen being plasma deposited onto polystyrene.

A skilled person would not conclude from this that it would be obvious to deposit a sulphur comprising material onto a metal, let along gold, by means of plasma deposition. Polystyrene is a vastly different material to gold.

This is even more so considering that Meade teaches a sulphur comprising compound that is not volatile enough to be able to be deposited by plasma deposition.

Instead, Meade describes the gold layer being arranged by standard methods, the self-assembled monomers (SAM's) referred to in claim 1 and in the examples.

Meade chooses SAM's since Meade requires a specific orientation of the compound on the surface whereby one terminal is pointed to the gold surface and the other terminal is pointed to the environment.

This type of orientation is not achieved in the current process by gas plasma deposition.

During gas plasma deposition a certain fragmentation of the compound occurs, which is an essential requirement for deposition of the compound. Meade most certainly does not want fragmentation to occur since this would damage the composition of the sulphur containing compounds whereby the interactions with the surfaces would be negatively influenced.

Furthermore, as stated above, the sulphur comprising compounds of Meade et al are not volatile enough to be able to be deposited by gas plasma deposition.

The Meade document does not mention the volatility of the sulphur compounds.

Accordingly a skilled person concludes that plasma deposition would not be considered for these sulphur compounds.

As such it would not be obvious for a skilled person, on the basis of Dunn and Meade, to directly arrange a sulphur comprising layer by means of plasma deposition onto a gold substrate.

Dr. ir. G. H. M. Engbers

Date: [illegible] 2004

Place: [illegible]